Lesson 1 Sketching Exponential & Logarithmic Functions

Exponential Functions

The function $y = a^x$ is an exponential function.

General Form: $f(x) = a^m$, where $a > 0 \; and \; a \neq 1$

Recall: Negative Exponent Law

$a^{-n} = \frac{1}{a^n}$ or $\frac{1}{a^{-n}} = a^n$

$\left(\frac{a}{b}\right)^{-n} = \left(\frac{b}{a}\right)^n$

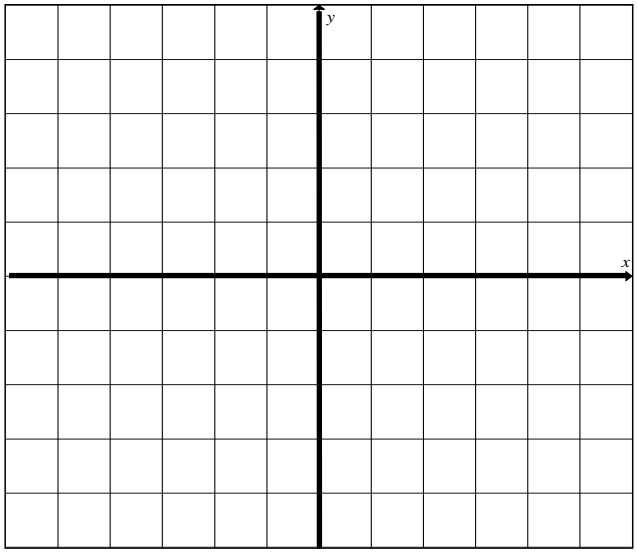
Logarithmic Functions

The inverse of the exponential function $y = a^x$ is $x = a^y$. This inverse is called a logarithmic function. and is written as $y = log_a x$ (***Read as***: "y equals the log of x in base a"), where "a" is a positive number other than 1.

Ex. 1) Sketch $y = 2^x$ and $x = 2^y$ on the same grid.

x	y

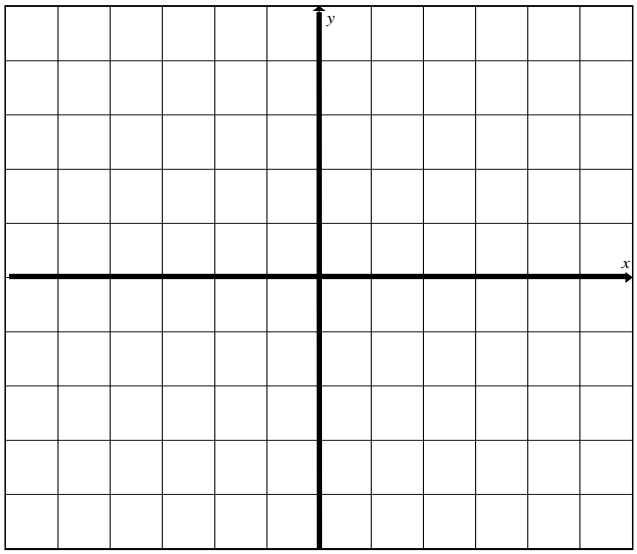
x	y



Ex. 2) Sketch $y = 3$ and $y = log_3 x$ on the same grid.

x	y

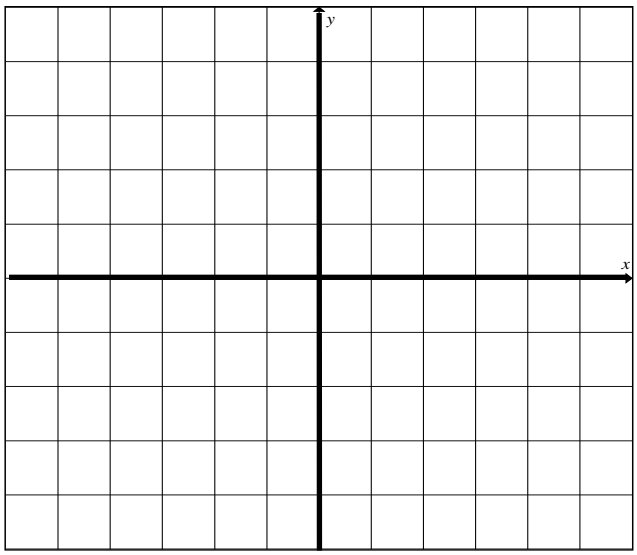
x	y



Ex. 3) Sketch $y = \left(\frac{1}{2}\right)^x$ and $y = log_{\frac{1}{2}} x$ on the same grid.

x	y

x	y



Properties of Exponential Functions

a) Zero(s)

b) If function is increasing or decreasing (behaviour from left to right)

c) y-intercepts

d) Equations of any asymptotes

e) Domain

f) Range

Properties of Logarithmic Functions

a) Zero(s)

b) If function is increasing or decreasing (behaviour from left to right)

c) y-intercepts

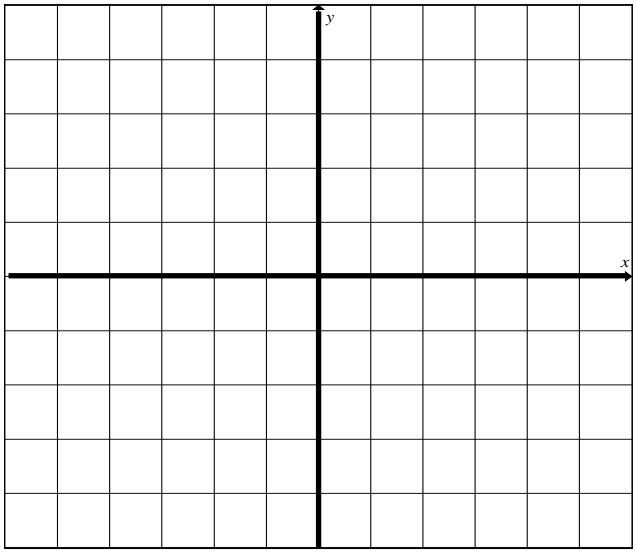
d) Equations of any asymptotes

e) Domain

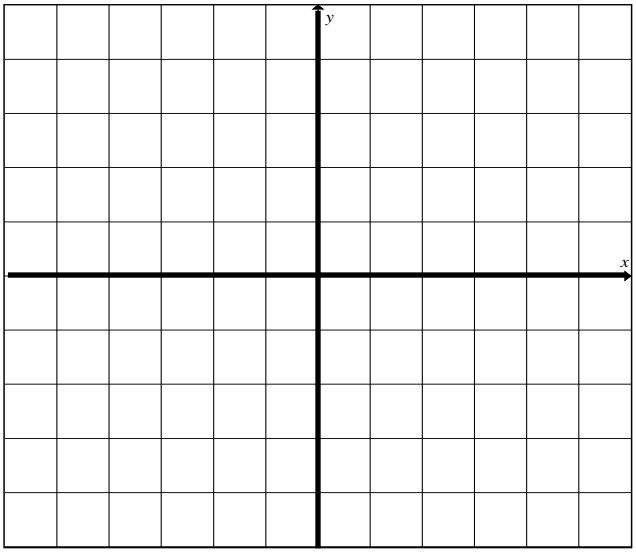
f) Range

Sketching, Using Transformations

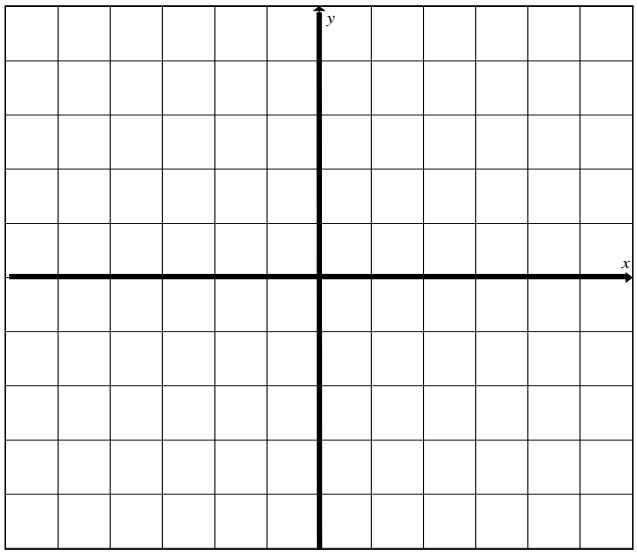
Ex. 4) Sketch $y = -2^x + 1$



Ex. 5) Sketch $y = 4^{(-x+2)}$



Ex. 6) Sketch $y = -log_3(x + 2)$



Ex. 7) Sketch $y = log_3\left(-\frac{1}{2}x\right) + 2$